

Fullagar, Jill

From: HUBLER Shannon <HUBLER.Shannon@deq.state.or.us>
Sent: Tuesday, March 03, 2015 4:56 PM
To: Hayslip, Gretchen
Cc: BRYANT Peter; STURDEVANT Debra; BOLING Brian; BORISENKO Aaron; LAMB Bonnie; URBANOWICZ Karla; Fullagar, Jill
Subject: RE: Biocriteria Assessments with low counts
Attachments: OE_Stress_Abunds_data quality_25feb15.xlsx

Hi Gretchen,

I apologize for the delay in getting this data to you. It really boiled down to me trying to get this right, so that we have as few errors as possible in the listing process. To aid in this, I've developed R-code that takes data directly out of my database, runs PREDATOR, and applies all data quality objectives (DQO).

Which O/E to use: the new R-code has been designed to pull data out of the database without creating text files that then need to be found in network folders to re-run, in order to replicate the same sample originally run through the model. Because there is a random subsampling (rarify routine) of each sample to 300 bugs total (max), each new random rarification creates a new subsample and thus potentially altering the O/E score. The new code resolves this by setting a random # seed, so the same random sample is generated each time. Thus, in all future assessments, we get the same O/E. (I honestly think we need to think about how we want to deal with this in future assessments by incorporating multiple random subsamples and taking an average O/E to reduce the subsampling error on O/E. But that's future work.) Now, for consistency sake with previous listings, anything with an oe.old should use that O/E value. Anything where oe.old = NA should use OoverE (or OoverE.null for SE OR sites).

I will attempt to define here the criteria I developed to outline DQOs for assessing macroinvertebrate data with the PREDATOR models. Keep in mind, however, that the biocriteria standard is narrative, and PREDATOR is not the only way in which to interpret the standard. For example, some sites may have bug data collected with different methods than used to construct the models, but the data can also be highly informative of impairments based on certain community characteristics (low taxa richness, high dominance, high tolerance, upstream vs. downstream differences, etc.).

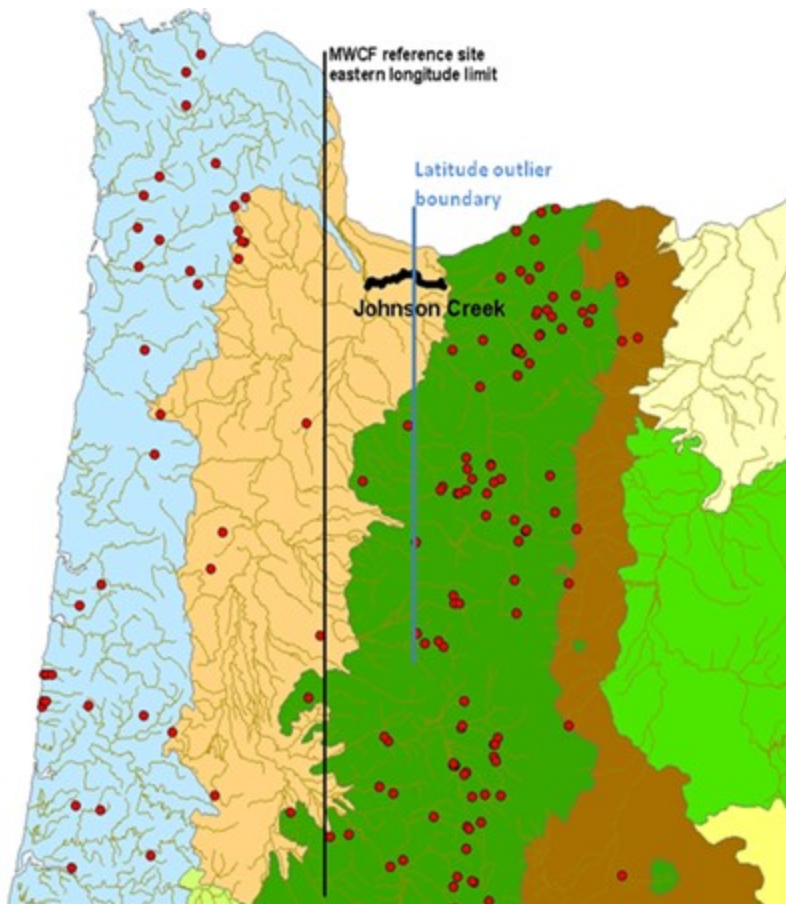
Habitat: (column E) Only riffle samples were used to construct the model. I flagged all other habitats as not meeting data quality objectives. (T = Transect, P = pool, O = other.) However, literature review suggests transect and riffle samples are largely transferrable, although there may be bias in lower O/E from very low gradient streams. (It's debatable whether or not this is due to real transect differences, or position in the watershed with—most frequently—accumulating disturbances.) We are considering shifting to transect based methods as our standard field protocols, so future assessments may need to revisit T samples as meeting data quality objectives.

wade_boat: PREDATOR was developed to assess wadeable streams. Methods for collecting macroinvertebrates from boatable sites are fairly different, in most cases. In addition, these larger sized streams are in most cases outside of the reference population used to build the PREDATOR models.

low.count: samples with PREDATOR model counts less than 150 total individuals were considered to have a "low count". I looked at the effect of total count on PREDATOR O/E values at reference and non-reference sites. There was a clear effect on O/E at reference sites with total counts < 150. (Given that O/E is a richness based metric, this is not unexpected.) To be clear, however, low total abundance can be a direct consequence of severe anthropogenic impairments. Supplementary data could be used to identify the likelihood that a low count was due to either impairments or sampling error (poor field effort, random heterogeneity in the stream, etc.). This would require substantial efforts with sample by sample screenings, similar to CADDIS approach.

methods.ok: Here I went through each “Project_name” (column I) and identified which projects had field and/or laboratory methods that varied significantly from those which were used to construct the PREDATOR models. For all DEQ owned projects, this is anything prior to 1999. I also identified certain projects that I have in my database for which I cannot verify their field methods. These samples were brought in to use in certain reports (e.g., Willamette Basin Rivers and Streams Assessment), but may not be appropriate for regulatory listing due to unknown data quality.

OE.outlier: A value of “Yes” shows that the sample failed the Chi-square test of environmental predictors, compared to the reference population, at the 0.01 level. This implies that there is a potential for unreliable predictions, because the site being assessed by the model is outside of the experience of the reference population. There are, in some cases, artifacts of the reference population that an outlier may not be such a big deal. For example, in the MWCF model, longitude is a predictor. The figure below shows that sites in the Willamette Valley, east of the outlier line, will be flagged as outliers, simply because they fall too far east of the easternmost reference site. Ecologically, this may not have a significant effect on predictions—and communications with researchers in these areas using PREDATOR suggest it has little effect on O/E; however caution should be exercised in determining whether or not to use these samples in a regulatory context.



Use.303d: here I combined all of the above data quality objectives (DQO) into a single Yes/No. The only samples with “Yes” meet the following criteria:

Habitat = R

Wade_boat = wadeable

Low.count = No
Methods.ok = Yes
OE.outlier = No

Reason.no.303d: this is a concatenation of all the reasons a sample did not pass the DQO.

Corrections to 2010 list:

I don't have which samples were listed in 2010 in my database. An easy way to look at this is to agree on which of my DQOs you agree with and filter them out from what was listed in 2010.

Please feel free to contact me with further questions. Again, apologies for the delay.

SH
503-693-5728

From: URBANOWICZ Karla
Sent: Friday, December 19, 2014 4:37 PM
To: 'Hayslip.Gretchen@epamail.epa.gov'; 'Fullagar, Jill'
Cc: HUBLER Shannon; BRYANT Peter; STURDEVANT Debra; BOLING Brian; BORISENKO Aaron; LAMB Bonnie
Subject: RE: Biocriteria Assessments with low counts

Hi Jill and Gretchen –

After talking with you today, it sounds like the following strategy to correct the biocriteria assessments is acceptable to you:

- 1) DEQ will provide a summary in an email of the methodology DEQ is using to determine the acceptable data quality for macroinvertebrate samples that addresses samples with low organism counts.
- 2) DEQ will provide Gretchen with macroinvertebrate sample data that has been screened and graded for acceptable data quality.
 - a. Shannon Hubler is working on this for the new data set requested by EPA for samples from 5/2010 to 10/2014. He will also include all the sample results used in DEQ's 2010 evaluation of data with the data quality screening for low organism counts.
 - b. Gretchen will evaluate the appropriate data that passes the data quality screening for additional 2012 303d listings.
- 3) If possible, DEQ will provide Gretchen with information identifying the corrections needed for biocriteria 303d listings added in 2010 and proposed to be added by DEQ in 2012 based on screening out the invalid sample results.
- 4) DEQ will provide EPA this information as soon as possible, and prior to EPA's public comment period on their 2012 303(d) additions. EPA will make the corrections as part of their actions on the 2012 303(d) list. EPA will use the information as the basis for "disapproving" some of DEQ's proposed 2012 additions, and for correcting listing added in 2010.

Thanks for accommodating these modifications.

This will give us more accurate biocriteria assessments and more confidence in our identification of impaired waters.
Happy Holidays!

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From: URBANOWICZ Karla
Sent: Wednesday, December 17, 2014 6:35 PM
To: 'Hayslip.Gretchen@epamail.epa.gov'
Cc: HUBLER Shannon; BRYANT Peter
Subject: Biocriteria Assessments with low counts

Hi Gretchen –

We have been fielding some questions about a new 303(d) listing for Biocriteria we added to the 2012 303d list for North For Whychus Creek (Record 23601):

Deschutes	North Fork	Biological	Year	Biocriteria: Waters	Aquatic	Cat 5:	Status	Waters
	Whychus Creek	Criteria	Round	of the state must	life	Water	modification	identified with
Upper	(formerly North			be of sufficient		quality	- Added to	impaired
Deschutes	Fork Squaw			quality to support		limited,	303(d) list	biological
17070301	Creek)			aquatic species		303(d)		conditions
	1216740441658			without		list,		reclassified as
23601	0 to 5.3			detrimental		TMDL		Cat 5: Water
	5.3			changes in the		needed		quality limited,
				resident biological				303(d) list.
				communities.				
								2010 Data:
								LASAR 35633
								River Mile 0.02
								FROM
								8/12/2000 To
								8/12/2000 1 out
								of 1 (100%)
								samples outside
								WCCP regional
								criteria.
								Previous Status:
								Cat 3C:
								Impairing
								pollutant
								unknown
								Previous Action:
								Added to
								database
								Previous
								Assessment
								Year: 2010

This new listing was one of 26 assessments for biocriteria that DEQ reclassified in order to eliminate use of Category 3C: Impairing pollutant unknown that was disapproved with the 2010 303(d) list.

On reviewing this assessment to answer the question from the US Forest Service, we found that the macroinvertebrate sampling data on that creek had been reviewed by Shannon Hubler in April 2014, and found to have low bug counts. To finalize the 2012 303(d) list, DEQ had reviewed the data used for the 2010 assessments and determined that samples with counts less than 150 organisms were not full valid samples and were not sufficient to determine impairment, but did indicate a potential concern. We had intended to correct the 2010 findings by delisting waters that had been found to be impaired based on samples with low bug counts. However, it looks like the intended assessments were not completed, and we only de-listed two biocriteria records. There may be on the order of 50 other listings that were based on questionable sample data. These include 10 assessments out of the 26 records that were re-classified and added to the 2012 303(d) list, but on review had low bug counts and are more properly classified as Insufficient data or potential concern, rather than impaired.

At this stage in the 2012 IR process, is there anything that can be done to correct our oversight?

One option is that the EPA not approve the addition of the 10 waters reclassified from Cat 3c to Cat 5. Another option would be for EPA to de-list the other waters with low bug counts that had been added to the 2010 303(d) list with EPA's action.

For your information, I attached spreadsheets containing the 10 re-classified assessments, including North Fork Whychus Creek, and a spreadsheet with the evaluation of the sample organism counts. The sheet called "w records" has the analysis of the samples relative to the assessment records, and notes which records should have been changed and/or delisted.

Thanks.

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